Keys to plants and lichens on smartphones: Estonian examples

Andres Saag, Tiina Randlane, Malle Leht

Abstract — The EU project *KeyToNature* aims to contribute to a better knowledge of biodiversity by a practical activity, the identification of species. The project is introducing new tools, including digital keys for mobile media. In Estonia two applications have been prepared for smartphones: a 'Key to trees and shrubs of Estonia' (for iPhone, iPodTouch and iPad) and a 'Key to Estonian epiphytic macrolichens' (using the Android operating system). A third tool, the 'Key for plants of the island Naissaar' is an example of application of the Open Key Editor for creating new keys for mobile devices, starting from a larger master key.

Index Terms — Estonia, e-tools, identification, keys, smartphones.

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1 Introduction

The UN has declared 2010 to be the International Year of Biodiversity. The world is invited to take action to safeguard the variety of life on Earth. Protecting or managing in a sustainable way the biota in any part of the world is possible only when their species are not only recorded and recognized by specialists, but also noticed and appreciated by the widest of audiences – by everyone.

The three-year EU project *KeyToNature* (http://www.keytonature.eu/), which started in 2007 and is finishing in autumn 2010, aims to contribute to a better knowledge of biodiversity by a practical activity, the identification of species.

The consortium introduces new tools for this purpose, keys that allow the easy identification of plants, lichens, birds and other organisms using digital, user-friendly facilities [1]. Hundreds of digital keys have been produced within *KeyToNature*, many of them in close cooperation with the University of Trieste, Italy, using FRIDA (FRiendly IDentificAtion), a software developed in this University. The keys are published online and are freely accessible to

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A. Saag and T. Randlane are with the Institute of Ecology and Earth Sciences, University of Tartu, Lai 38/40, Tartu 51005, Estonia. E-mail: andres.saag@ut.ee, tiina.randlane@ut.ee.
M. Leht is with the Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences, Kreutzwaldi 5, Tartu 51014, Estonia. E-mail: malle.leht@emu.ee.

everyone. They can also be stored on CD-ROMs, to be used without an Internet connection. Those who still prefer paper-printed keys can print out their own "keybook". The latest trend is to develop applications which permit the use of digital keys on mobile media, such as palmtop computers and smartphones, either online or in stand-alone form.

2 DIGITAL KEYS ON MOBILE MEDIA

2.1 GENERAL

A smartphone is a mobile phone that offers more advanced computing ability and connectivity than a contemporary basic mobile phone. Smartphones allow the user to install and run various applications based on a specific platform, as they run complete operating system software providing a platform for application developers. These advanced mobile devices possess powerful processors, abundant memory, larger multi-touch screen and a virtual keyboard with e-mail, web browsing and WiFi connectivity. Today smartphones form the fastest growing segment of the mobile phone market [2].

Identification keys in the mobile phones show several advantages compared to the usual digital keys accessible through Internet or on CD-ROMs. Firstly, they enable the use of identification tools not merely at home, in a classroom or in a lab, but also in the field. The possibility to identify the exact geographical location of a plant by GPS (inserted in the mobile phone) and to send additional information (photos, notes, descriptions) via email – for example, to a botany expert for the evaluation of an identification – is a valuable supplementary function of such applications.

2.2 A BOTANIST IN YOUR POCKET: THE KEY TO ESTONIAN TREES AND SHRUBS

The Estonian eFlora is an interactive digital identification key for c. 1100 plant species (out of ca 1500 taxa recorded from Estonia), including several introduced tree species. Some taxa from critical genera are excluded from this key, as well as several very rare species. The key was presented to a wide audience of students, teachers etc. in Tartu (Estonia), in September 2009, and is permanently freely available in Estonian and in English at http://dbiodbs.univ. trieste.it/carso/chiavi_pub21?sc=368.

Presently, two adaptions for smartphones are available: a 'Key for trees and shrubs of Estonia' (for iPhone, iPodTouch and iPad), and a 'Key for plants of the island Naissaar' (using the Android operating system).

The application 'Key for trees and shrubs of Estonia' (Fig. 1) allows users to:
1. Identify more than 140 tree and shrub species in Estonia.
2. See the explanatory files about species and access the photo gallery.
3. Search by taxon name.
4. Post the identified species to Facebook.
5. Take pictures and add field notes to one's guide.
6. Send multimedia content (pictures and notes) stored in the device via email.

The application was developed by Divulgando Srl (Italy) and released publicly at the end of 2009. It is available for download from the iTunes App Store for a symbolic price of 2,39 EUR. During a short period (18.–24. January 2010), it was even at the very top of the list of Paid Apps in the iTunes App Store and still today it is top ranking in those for the educational sector.

The 'Key for plants of the island Naissaar' is an example of a filtered key derived from the Estonian eFlora, generated by a new sofware, the OpenKeyEditor of *KeyToNature* [3] specifically for a mobile device. This key, which includes 415 plant species, was ordered by a company carrying out nature-educational training courses on the island Naissaar.

Both tools display a dichotomous interface where each step of the identification process is richly illustrated with pictures and drawings [3]. As the applications can be downloaded to the memory card of a smartphone, they can be used in stand-alone form without additional web-browsing charges (with some limitations in the access to the image archives, compared to the online keys).

2.3 A LICHENOLOGIST IN YOUR POCKET: THE KEY TO ESTONIAN EPIPHYTIC MACROLICHENS

Another application for smartphones, using the Android operating system, has been developed by the Company Mine Avasta (Estonia), based on an internet key which was produced in cooperation between the University of Trieste (Italy) and the University of Tartu. This application enables the identification of 115 species of epiphytic macrolichens known to occur in Estonia (Fig. 1). The main principles are similar to those of the previously described application: it allows identification of taxa using a simple dichotomous key in which the user has to decide between two options; it is also possible to search the taxon by its Estonian or Latin name, and then get additional information about the species – read a summary of diagnostic characters, and see the photos and distribution map of the species in Estonia. As the characters of lichens which are used in the key are less familiar to the wide audience, an explanation of the main characters of lichens in the form of an illustrated glossary is also provided.

The tool was uploaded into the Android Market in July 2010, and is free of charge.

3 CONCLUSION

The two Estonian examples of digital identification keys for smartphones were meant to attract the attention of a wide circle of non-specialists: pupils, students, teachers, forestry workers, nature conservation staff, tourists etc. – to increase public awareness of biodiversity and to allow new approaches in nature education. Both tools are available not only as smartphone applications but also on the Internet as interactive keys, freely accessible to everyone (http://dbiodbs.univ.trieste.it/carso/chiavi_pub21?sc=175, trees and shrubs; http://dbiodbs.univ.trieste.it/carso/chiavi_pub21?sc=159, epiphytic macrolichens).

We have already received positive feedback from a large audience through

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Fig. 1 – Front pages of the mobile applications 'Key for trees and shrubs of Estonia' (left) and 'Key for the identification of Estonian epiphytic macrolichens' (right).

public media (newspaper articles, electronic publications, broadcasts) indicating that the local society is willing to accept and use the new interactive e-learning devices in everyday life [4], [5], [6].

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